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18EC46

**Fourth Semester B.E. Degree Examination, Feb./Mar. 2022**

**Microcontroller**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

**Module-1**

- 1 a. Analyze the architecture of Intel 8051 Microcontroller. (08 Marks)
- b. Compare RISC and CISC architecture. (04 Marks)
- c. Interface 4K ROM and 2K RAM with 8051 microcontroller with relative memory mapping. (08 Marks)

**OR**

- 2 a. Sketch the register organization of Intel 8051 and briefly explain. (08 Marks)
- b. Compare microprocessor and microcontroller. (04 Marks)
- c. What is the purpose of PSW register? How flags are affected? Give examples. (08 Marks)

**Module-2**

- 3 a. Briefly explain the arithmetic instructions of INTEL 8051 microcontroller. (08 Marks)
- b. Explain four addressing modes with examples. (04 Marks)
- c. Write assembly language programming to transfer a block of data from external RAM to internal RAM. (08 Marks)

**OR**

- 4 a. For 8051 microcontroller operated with 12MHz crystal frequency, solve the execution time for the following instructions.
  - i) DJNZ R<sub>1</sub>, BACK
  - ii) MUL AB. (08 Marks)
- b. Identify the addressing mode used in the following instructions :
  - i) ADD A, @R<sub>0</sub>
  - ii) MOVC A, @A + PC
  - iii) CLR C
  - iv) SWAP A. (04 Marks)
- c. Write assembly language program to convert 8-bit binary number to its equivalent BCD. (08 Marks)

**Module-3**

- 5 a. Examine how stack memory can be accessed using PUSH and POP instructions. (08 Marks)
- b. Calculate the item taken to execute four machine cycle for the crystal frequency
  - i) 12MHz
  - ii) 16MHz. (04 Marks)
- c. Develop a subroutine to find the time delay of 1/2 second using 8051 to blink the LEDs connected to port 0, show the calculations and necessary steps used. (08 Marks)

**OR**

- 6 a. Write a note on subroutine using CALL and RET instructions. (08 Marks)
- b. Develop assembly language program to load accumulator with the value 55H and complement the contents of accumulator 900 times. (04 Marks)
- c. Write a subroutine to find the factorial of a given number. (08 Marks)

**Module-4**

- 7 a. Explain the functions of each bit in the TMOD and SCON register. (08 Marks)  
b. Write an 8051 C program to send binary counter values from 00H – FFH to port P1. (04 Marks)  
c. Develop an 8051 C program to toggle bits of port 1 to turn OFF and ON LEDs connected to the port 1. (08 Marks)

**OR**

- 8 a. Analyze the structure of TCON register. (08 Marks)  
b. Explain Full duplex, Half duplex and simplex serial data transfer. (04 Marks)  
c. Write assembly language program to transfer “GOOD Luck” serially at 9600H baud, 8 – bit data, 1 – stop bit. (08 Marks)

**Module-5**

- 9 a. Explain different types of interrupts in 8051 microcontroller. (08 Marks)  
b. Develop an 8051 assembly language program to flash the LED connected to port 2.0. (04 Marks)  
c. Analyze how multiplexed 7 – segment display can be interfaced to 8051 microcontroller. (08 Marks)

**OR**

- 10 a. Assume that XTAL = 11.0592MHz. Write a program to generate a square wave of 2KHz frequency on pin P1.5. (08 Marks)  
b. Develop an 8051 C program to flash the LED connected to Port 1.0. (04 Marks)  
c. Analyze interrupt control used in 8051 microcontroller. (08 Marks)

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